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10/029,394	12/28/2001	Jum Soo Kim	123034-05004731	2075

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LOWE HAUPTMAN HAM & BERNER, LLP
1700 DIAGONAL ROAD
SUITE 300
ALEXANDRIA, VA 22314

EXAMINER	
NGUYEN, KHIEM D	

ART UNIT	PAPER NUMBER
2823	

MAIL DATE	DELIVERY MODE
03/04/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/029,394	KIM ET AL.	
	Examiner	Art Unit	
	KHIEM D. NGUYEN	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. The Amendment filed on December 18th, 2008 is acknowledged. Claims 7 and 13-15 have been amended. Claims 7-15 are pending in the present application.

New Grounds of Rejection

Claim Objections

2. Claims 7 and 13 are objected to because of the following informalities:

In claim 7, line 11, please replace "a gate including and the control" with --a gate including the control--.

In claim 13, lines 7-8, please replace "distinct the peripheral region" with --the distinct peripheral region--.

In claim 13, line 12, please replace "a gate including and the control" with --a gate including the control--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 7-10 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Fang (U.S. Patent 6,667,511), of record.

In re claim 7, **Fang** discloses a method of manufacturing a code address memory cell in a peripheral circuit region and a flash memory cell in a cell region, the method comprising:

forming a tunnel oxide layer **308** and a floating gate layer **312** on a semiconductor substrate **304** including a cell region and a distinct peripheral region (see col. 9, lines 32-42 and FIG. 9b);

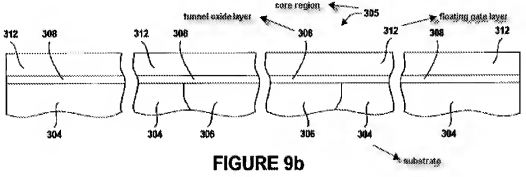

FIGURE 9b

removing the floating gate layer **312** and the tunnel oxide layer **308** formed on the distinct peripheral region **313** (see col. 9, lines 43-56 and FIG. 9c);

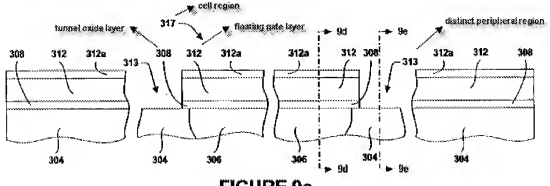

FIGURE 9c

forming a dielectric layer **322** and a control gate layer **338** on the cell region **317** and the peripheral circuit region **313** of the semiconductor substrate **304**, the dielectric layer **322** including an oxide layer and a nitride layer (oxide/nitride/oxide, ONO layer), (see col. 10, lines 29-65 and FIGS. 9f-g);

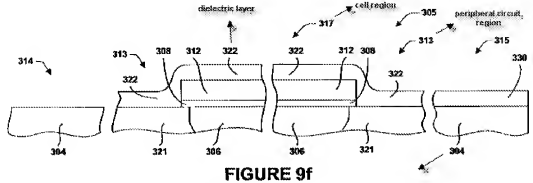

FIGURE 9f

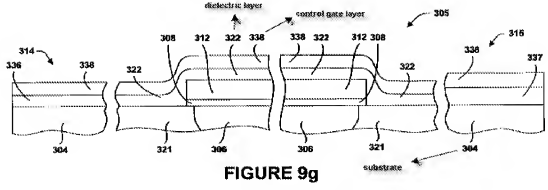

FIGURE 9g

patterning the control gate layer **338**, the dielectric layer **322**, the floating gate layer **312** and the tunnel oxide layer **308** to form a stack gate on the cell region **346** and a gate including the control gate layer **338** and the dielectric layer **322** on the distinct peripheral region **348** (see col. 11, lines 6-19 and FIG. 9i); and

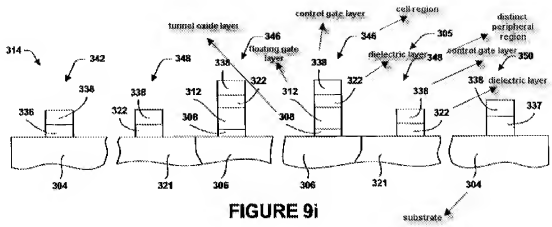

FIGURE 9i

forming a source **S** and a drain **D** region in the semiconductor substrate by performing an impurity ion implantation process (see FIGS. 7a-b).

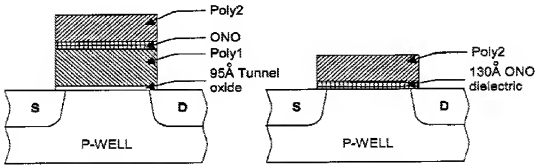

FIGURE 7a **FIGURE 7b**

In re claim 8, as applied to claim 7 above, **Fang** discloses all claimed limitations including the limitation wherein the dielectric layer **322** is formed by stacking at least two or more layers of at least one of the oxide layer and the nitride layer (oxide/nitride/oxide, ONO layer) (see col. 10, lines 35-38).

In re claim 9, as applied to claim 7 above, **Fang** discloses all claimed limitations including the limitation wherein the dielectric layer **322** is formed in thickness of about 130 Å (see col. 10, lines 35-38).

In re claim 10, as applied to claim 7 above, **Fang** discloses all claimed limitations including the limitation wherein the dielectric layer **322** is formed by stacking a first oxide layer (O), a nitride layer (N) and a second oxide layer (O) (oxide/nitride/oxide (ONO)) (see col. 10, lines 35-38).

In re claim 14, as applied to claim 7 above, **Fang** discloses all claimed limitations including the limitation wherein the floating gate layer **312** and the control gate layer **338** is formed of polysilicon (see col. 9, lines 36-42 and col. 10, lines 60-65).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fang (U.S. Patent 6,667,511) in view of Sheng et al. (U.S. Patent 5,981,404), both of record.

In re claim 11, as applied to claim 7 Paragraph 4 above, **Fang** discloses all the claimed limitation including wherein the dielectric layer **322** is formed by stacking a first oxide layer, a nitride layer and a second oxide layer (oxide/nitride/oxide (ONO)) (see col. 10, lines 35-38) but **Fang**, however, does not specifically disclose that the dielectric layer is formed by stacking a first oxide

layer (O), a first nitride layer (N), a second oxide layer (O), and a second nitride layer (N), (ONON).

Sheng et al., disclose an insulating structures used in DRAMs or other memory devices such that the dielectric layer is formed by stacking a first oxide layer **30**, a first nitride layer **32**, a second oxide layer **34**, and a second nitride layer **36** (ONON) between the lower doped polysilicon electrode **10** and the upper doped polysilicon electrode **14** (see col. 7, line 56 to col. 8, line 49 and FIG. 6).

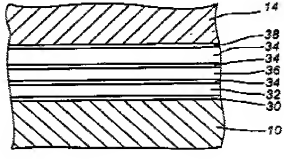

FIG. 6

As **Sheng et al.** disclose, one of ordinary skill in the art would have been motivated to provide a dielectric layer formed by stacking a first oxide layer, a first nitride layer, a second oxide layer, and a second nitride layer (ONON) because such repeated layer structures exhibit higher levels of breakdown voltage than more conventional "ONO" structures thereby improving device characteristics (see Abstract of Sheng et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant(s) claimed invention was made to modify **Fang** reference with the dielectric layer formed by stacking a first oxide layer, a first nitride layer,

a second oxide layer, and a second nitride layer (ONON) as taught by **Sheng et al.** because such repeated layer structures exhibit higher levels of breakdown voltage than more conventional "ONO" structures thereby improving device characteristics (see Abstract of Sheng et al.).

In re claim 12, as applied to claim 7 Paragraph 4 above, **Fang** discloses all the claimed limitation including wherein the dielectric layer **322** is formed by stacking a first oxide layer, a nitride layer and a second oxide layer (oxide/nitride/oxide (ONO)) (see col. 10, lines 35-38) but **Fang**, however, does not specifically disclose that the dielectric layer is formed by stacking a first oxide layer (O), a first nitride layer (N), a second oxide layer (O), a second nitride layer (N), and a third oxide layer (O), (ONONO).

Sheng et al., disclose an insulating structures used in DRAMs or other memory devices such that the dielectric layer is formed by stacking a first oxide layer **30**, a first nitride layer **32**, a second oxide layer **34**, a second nitride layer **36**, and a third oxide layer **34**, (ONONO) between the lower doped polysilicon electrode **10** and the upper doped polysilicon electrode **14** (see col. 7, line 56 to col. 8, line 49 and FIG. 6).

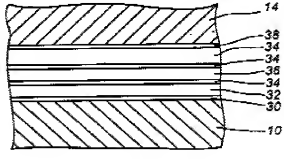

FIG. 6

As **Sheng et al.** disclose, one of ordinary skill in the art would have been motivated to provide a dielectric layer formed by stacking a first oxide layer, a first nitride layer, a second oxide layer, a second nitride layer and a third oxide layer (ONONO) because such repeated layer structures exhibit higher levels of breakdown voltage than more conventional "ONO" structures thereby improving device characteristics (see Abstract of Sheng et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant(s) claimed invention was made to modify **Fang** reference with the dielectric layer formed by stacking a first oxide layer, a first nitride layer, a second oxide layer, a second nitride layer and a third oxide layer, (ONONO) as taught by **Sheng et al.** because such repeated layer structures exhibit higher levels of breakdown voltage than more conventional "ONO" structures thereby improving device characteristics (see Abstract of Sheng et al.).

7. Claims 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fang (U.S. Patent 6,667,511) in view of Sheng et al. (U.S. Patent 5,981,404), both of record.

In re claim 13, **Fang** discloses a method of manufacturing a code address memory cell in a peripheral circuit region and a flash memory cell in a cell region, the method comprising:

forming a tunnel oxide layer **308** and a floating gate layer **312** on a semiconductor substrate **304** including a cell region and a distinct peripheral region (see col. 9, lines 32-42 and FIG. 9b);

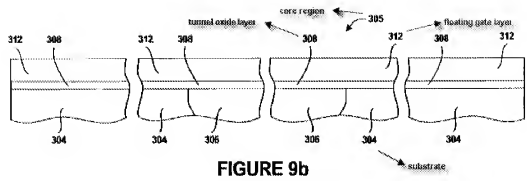

FIGURE 9b

removing the floating gate layer **312** and the tunnel oxide layer **308** formed on the distinct peripheral region **313** (see col. 9, lines 43-56 and FIG. 9c);

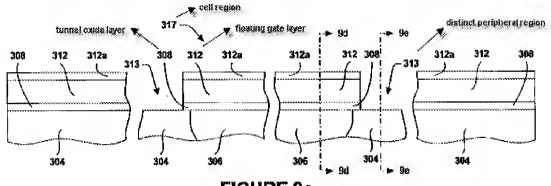

FIGURE 9c

forming a dielectric layer **322** and a control gate layer **338** on the cell region **317** and the distinct peripheral region **313** of the semiconductor substrate **304**, the dielectric layer **322** including a first oxide layer, a first nitride layer, and a second oxide layer (oxide/nitride/oxide layer, ONO) (see col. 10, lines 29-65 and FIGS. 9f-g);

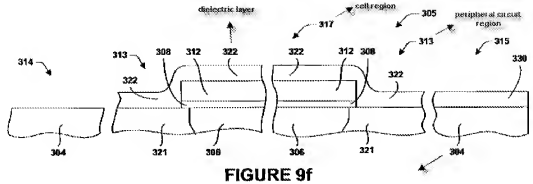

FIGURE 9f

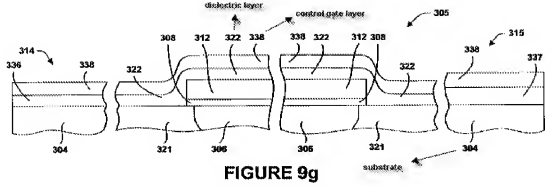

FIGURE 9g

patterning the control gate layer **338**, the dielectric layer **322**, the floating gate layer **312** and the tunnel oxide layer **308** to form a stack gate on the cell region **346** and a gate including the control gate layer **338** and the dielectric layer **322** on the distinct peripheral region **348** (see col. 11, lines 6-19 and FIG. 9i); and

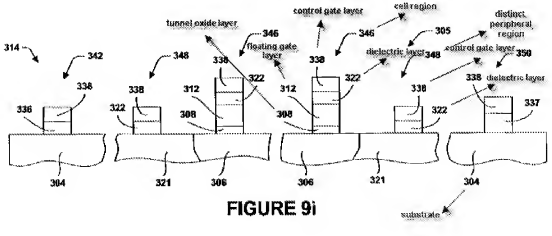

FIGURE 9i

forming a source **S** and a drain **D** region in the semiconductor substrate by performing an impurity ion implantation process (see FIGS. 7a-b).

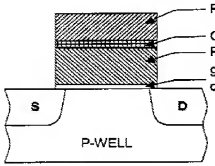

FIGURE 7a

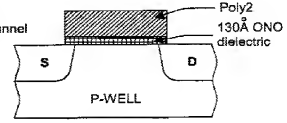

FIGURE 7b

However, **Fang** does not specifically disclose that the dielectric layer including a first oxide layer (O), a first nitride layer (N), a second oxide layer (O), a second nitride layer (N), and a third oxide layer (O), (ONONO).

Sheng et al., disclose an insulating structures used in DRAMs or other memory devices such that the dielectric layer is formed by stacking a first oxide layer **30**, a first nitride layer **32**, a second oxide layer **34**, a second nitride layer **36**, and a third oxide layer **34**, (ONONO) between the lower doped polysilicon electrode **10** and the upper doped polysilicon electrode **14** (see col. 7, line 56 to col. 8, line 49 and FIG. 6).

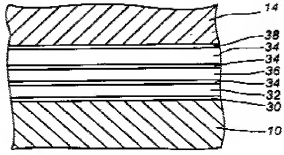

FIG. 6

As **Sheng et al.** disclose, one of ordinary skill in the art would have been motivated to provide a dielectric layer including a first oxide layer, a first nitride layer, a second oxide layer, a second nitride layer and a third oxide layer (ONONO) because such repeated layer structures exhibit higher levels of breakdown voltage than more conventional "ONO" structures thereby improving device characteristics (see Abstract of Sheng et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant(s) claimed invention was made to modify **Fang** reference with the dielectric layer including a first oxide layer, a first nitride layer, a second oxide layer, a second nitride layer and a third oxide layer, (ONONO) as taught by **Sheng et al.** because such repeated layer structures exhibit higher levels of breakdown voltage than more conventional "ONO" structures thereby improving device characteristics (see Abstract of Sheng et al.).

In re claim 15, as applied to claim 13 above, **Fang** in view of **Sheng et al.** disclose all claimed limitations including the limitation wherein the floating gate layer **312** and the control gate layer **338** is formed of polysilicon (see col. 9, lines 36-42 and col. 10, lines 60-65 of Fang).

Response to Applicants' Amendment and Arguments

8. Applicants' arguments with respect to claims 7-15 have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendment filed on December 18th, 2008.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure.
    - Jan et al. (U.S. Patent 6,274,430) disclose a fabricating method for a high voltage electrically erasable read only memory.
    - Wu et al. (U.S. Patent 6,445,030) disclose a method of making a non-volatile semiconductor memory cell.
10. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however,

will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHIEM D. NGUYEN whose telephone number is (571)272-1865. The examiner can normally be reached on Monday-Friday (8:30 AM - 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Khiem D. Nguyen/

Examiner, Art Unit 2823

/K. D. N./
February 27th, 2009